

REMARKS

Claim 6 has been amended. Claims 1-5 and 7 are unchanged. Claims 8-11 are new. Figure 3 has also been amended. No new matter has been added.

I. Drawings

The drawings have been objected to because the boxes in Figure 3 do not include a brief descriptive label. Enclosed is a Replacement Sheet for amended Figure 3 which addresses the Office Action's objection to the figures. In particular, each box in the amended Figure 3 now includes a brief descriptive label. Support for this amendment can be found in the specification at page 4, lines 9-29. No new matter has been added.

II. Objections to Claims 6 and 7 and New Claims 8-11

Applicants gratefully acknowledge the Examiner's indication of allowability for claims 6 and 7, subject to an objection for being dependent upon a rejected base claim and a requirement that these claims be rewritten to be in independent form including all limitations of the base claim and any intervening claims.

Claim 6 has been currently amended to be in independent form and to include all the limitations of its base claim. As such, Applicants respectfully request allowance of claim 6. As claims 7-11 are dependent from claim 6, allowance for these dependent claims are likewise respectfully requested.

III. Claim Rejections of Claims 1-5

Claims 1 and 3-5 stand rejected under 35 U.S.C. § 102(b) as being anticipated by, or in the alternative, as being obvious over U.S. Patent No. 5,184,733 (Arnarson) in view of U.S. Patent No. 5,319,160 (Nambu) and U.S. Patent No. 5,561,274 (Brandorff). Claim 2 stands rejected under 35 U.S.C. § 103(a) as being obvious over U.S. Patent No. 5,184,733 (Arnarson) in view of U.S. Patent No. 3,545,610 (Kelly). Applicants respectfully traverse these rejections.

Independent claim 1 recites at least the following limitations:

- a light-emitting unit, emitting light beams irradiating on the surface of materials transported on a belt to form a bright projection which has the same shape as that of a upper contour of a cross-section of the material;
- a CCD camera for continuously picking up images of the bright projection on the upper contour of the cross-section of the material;
- an image capture unit, connected to the CCD camera for continuously capturing the images; and
- a central processing unit, connected to the image capture unit for processing the images captured by the image capture unit to compute the weight of the material.

The Office Action, at paragraph 4, line 5, asserts that these limitations are disclosed in the Arnarson reference. Applicants respectfully disagree.

The Arnarson reference discloses an apparatus and method for determining the volume, form, and weight of objects using a linescan camera to measure dimensions of the object. The dimensions of the objects are then used to calculate the weight of the object. In particular, the Arnarson approach takes a picture at various intervals as the object to be measured passes beneath a camera (col. 2, lines 48-50).

Importantly, the Arnarson approach does not use, process, or pick up the contour of the cross-section to calculate the weight of an object as is presently claimed. Instead, Arnarson very specifically only measures and uses the maximum thickness of each cross-section, as well as its width, to calculate the weight of an object. See col. 2, lines 60-65. As such, Arnarson assumes that the cross section of the object can be regarded as a rectangular shape during measurement and calculation. The only two values being measured -- the width (b) of the object and its thickness (h) -- are used to calculate the cross-sectional area A using the formula $A = b \times h \times \beta$, where β is a form factor value (see col. 2, line 60 to col. 3, line 4).

Arnarson makes the very clear point that it is of particular advantage to only measure the two measurement points of a width and a single measurement point of the maximum height of a cross-section of the object at each interval, since this approach allegedly provides greater accuracy and efficiency (col. 3, lines 35-42).

Nowhere does Arnarson disclose using the upper contour of the cross section of the object being captured, as presently claimed, in which a CCD camera continuously picks up images of the bright projection on the upper contour of the cross-section of the material, where

an image capture unit is connected to the CCD camera for continuously capturing the images, and further wherein a central processing unit is connected to the image capture unit for processing the images captured by the image capture unit to compute the weight of the material. The Arnarson approach is in sharp contrast, and actually teaches away from the presently claimed limitations relating to the upper contour of the cross-section, since Arnarson teaches that it is particularly advantageous to only measure two points (width and maximum height) for each cross-section.

In fact, it is not possible for the system configuration described in Arnarson to capture an image of the contour of the object being measured. Arnarson locates its camera so as to directly take a top plan image of the object. In addition, a mirror is positioned aside the project a profile image of the object into a camera (see col. 2, lines 25-42 and Fig. 4). With such a configuration, the system could not physically capture the contour of the cross-section as presently claimed in claim 1.

Moreover, Arnarson does not describe using a light-emitting unit to form a “bright projection corresponding to the upper contour” as presently claimed in claim 1. In the Arnarson approach, the light source 7 and 8 are used to illuminate object (see col. 2, line 41) to provide a clear image for a camera, but nothing in Arnarson discloses that the light source is capable of or is used to form a bright projection corresponding to the upper contour.

None of the other cited references make up these deficiencies of Arnarson. The Kelly reference only measures the optical parameters reflected from a measured object, but does not measure any contours. The Brandorff reference discloses a weight sensor apparatus for weighing objects, and does not have any description of using a camera to record the contour of a cross-section of an object. The Nambu reference discloses an article collecting device, and likewise does not have any description of using a camera to record the contour of a cross-section of an object.

Furthermore, since Arnarson teaches away from this limitation, it is respectfully submitted that even if this limitation is taught by the other references, those references cannot be combined with Arnarson to achieve the claimed invention. Moreover, Arnarson cannot be combined with other references and modified to achieve this limitation, since such a

modification would negatively change the principles of operation for Arnarson and render it unfit for its intended purposes of limiting the number of points to record for each cross-section.

For at least this reason, it is respectfully submitted that claim 1 is not anticipated or rendered obvious by the cited references. Since claims 2-5 are dependent from claim 1, it is respectfully submitted that these dependent claims are likewise not anticipated or rendered obvious by the cited references.


CONCLUSION

Based on the foregoing, all claims are believed allowable, and an allowance of the claims is respectfully requested. If the Examiner has any questions or comments, the Examiner is respectfully requested to contact the undersigned at the number listed below.

If the Commissioner determines that additional fees are due or that an excess fee has been paid, the Patent Office is authorized to debit or credit (respectively) Deposit Account No. 50-2518, billing reference no. 7044792001.

Respectfully submitted,
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Dated: January 12, 2006

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